Docket No.	:	SHIGA7.035APC	**Customer No.: 20,995**
Application No.	:	10/561,802	
Filing Date	:	December 22, 2005	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPEAL BRIEF

Applicant	:	Washio et al.
App. No	:	10/561,802
Filed	:	December 22, 2005
For	:	DEVELOPER COMPOSITION FOR RESISTS AND METHOD FOR FORMATION OF RESIST PATTERN
Examiner	:	Le, Hoa Van
Art Unit	:	1795

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Neil S. Bartfeld, Ph.D., Reg. No. 39,901

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the Notice of Appeal filed **March 25, 2008**, Applicant submits this Appeal Brief.

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I. REAL PARTY IN INTEREST

Pursuant to 37 C.F.R. §1.192, Appelants hereby notify the Board of Patent Appeals and Interferences that the real party in interest is the assignee of this application, Tokyo Ohka Kogyo Co., Ltd., 150, Nakamaruko, Nakahara-ku, Kawasaki-shi, Kanagawa-ken, Japan.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

III. STATUS OF CLAIMS

The above-identified application was filed on December 22, 2005, with 4 claims. Claims 1-4 were rejected in an Office Action mailed September 25, 2006. In response to this Office Action, Applicants filed an amendment on December 20, 2006, amending claim 1. Claims 1-4 were finally rejected by the Examiner in a Final Office Action mailed January 30, 2007. In response to the final rejection, Applicants filed a response on April 27, 2007 which did not include any claim amendments. An Advisory Action was mailed on May 9, 2007, which stated that the request for reconsideration was considered, but did not place the application in condition for allowance. In response to the Advisory Action and Final Office Action, Applicants filed a Notice of Appeal, Pre-Appeal Request for Review, and Terminal Disclaimer on May 24, 2007. In response to the Pre-Appeal Request for Review, the PTO mailed a Panel Decision reopening prosecution, and withdrawing the previous rejection. A non-final Office Action was mailed on August 2, 2007 rejecting claims 1-4. In response to the Office Action, Applicants filed a request for reconsideration on November 1, 2007. Claims 1-4 were finally rejected by the Examiner in a Final Office Action mailed December 27, 2007. In response to the Final Office Action, Applicants filed a Notice of Appeal and Pre-Appeal Request for Review on March 25, 2008. In response to the Pre-Appeal Request for Review, the PTO mailed a Panel Decision on April 15, 2008, which stated that the application remained under appeal. Claims 1-4 are currently pending and are the subject of the Appeal Brief.

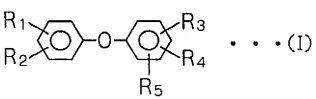
IV. STATUS OF AMENDMENTS

No amendments/responses have been filed subsequent to the response filed November 1, 2007, in which no claim amendments were made.

V. CONCISE EXPLANATION OF SUBJECT MATTER OF INDEPENDENT CLAIM

Claim 1 is the sole independent claim in this appeal. The subject matter of this claim relates to a developer composition for resists, comprising an organic quaternary ammonium base as a main component and a metal-containing surfactant having the general formula (I) shown in the claim. Applicants' invention is based, in part, on their unexpected discovery that the use of metal-containing surfactants results in a higher dissolution rate than ammonium-based surfactants.

Each limitation of the independent claim, is supported by the Specification as filed as follows:

CLAIM NO.	LIMITATION	SUPPORT
1	A developer composition for resists, comprising an organic quaternary ammonium base as a main component and a surfactant, said surfactant containing an anionic surfactant represented by the following general formula (I):  • • • (I)	Page 2, line 20 to page 3, line 1; Page 10; Examples 1-15; Page 15 (Table 1).

1	wherein at least one member of R_1 and R_2 represents an alkyl or alkoxy group having 5 to 18 carbon atoms and any remaining member represents a hydrogen atom, or an alkyl or alkoxy group having 5 to 18 carbon atoms, and at least one member of R_3, R_4 and R_5 represents a group represented by the following general formula (II): $-SO_3M \quad \cdots \quad (II)$	Page 3, lines 2-7; Page 10; Examples 1-15; Page 15 (Table 1).
1	wherein M represents a metal atom, and any remaining member represent a hydrogen atom or a group represented by the above general formula (II).	Page 3, lines 8-9; Page 10; Examples 1-15; Page 15 (Table 1).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Examiner has rejected Claims 1-4 under 35 U.S.C. §103(a) as allegedly being unpatentable over Sato et al. (US 5,985,525) in view of Anzures et al. (US 6,900,003) and vice versa. The Examiner also contends that Tanaka et al. (US 5,543,268) and Tanaka et al. (US 6,639,126) have about the same teachings as Sato et al., and are cumulative.

VII. ARGUMENTS

In the final Office Action mailed December 27, 2007, the Examiner alleges that since the Sato et al. and Anzures et al. references are generally related to developers, it would have been obvious to use: 1) an alkali metal salt of a diphenyl oxide sulfonic group for reasonable expectation of obtaining the advantage of reducing residue in a developing solution and/or on a developing substrate as disclosed by Anzures et al; and 2) an organic quaternary ammonium for reasonable expectation of obtaining an alkaline solution to remove a soft portion of a later as disclosed by Sato et al. However, as explained below, the combination of these references, using either as a primary

reference, would not lead one of ordinary skill in the art to the claimed invention. Accordingly, the claimed invention is not obvious over these references.

Metal-Containing Surfactants are undesirable for use in semiconductors

Sato et al. discloses a developer composition comprising an organic quaternary ammonium base and a specific ammonium salt of alkyl diphenyl ether sulfonic acid. Sato et. al. clearly teaches that a developer composition in the field of semiconductors contains **no metallic element** which contaminates the semiconductor devices. At Column 1, lines 24-29, Sato et al. states that:

> It is usual that the alkaline developer solution contains an organic base free from any metallic element...in consideration of the possible adverse influences caused on the performance of the semiconductor devices by the metallic contaminant coming from the developer solution.

Thus, Sato characterizes metallic elements as a "contaminant" which negatively impacts performance of the semiconductor devices being produced. As such, the use of metallic elements in combination with Sato's teachings would render these teachings unsatisfactory for its intended purpose of manufacturing semiconductor devices.

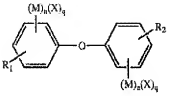
The two Tanaka et al. references cited by the Examiner as cumulative similarly teach away from the presently claimed invention by teaching that metallic elements are undesirable contaminants. See, e.g. Tanaka 5,543,268 at Column 1, lines 48-57 and Column 3, lines 38-39 and Tanaka 6,329,126 at Column 1, lines 49-58 and Column 3, lines 36-37. Thus, in view of Sato et al. or either of the two Tanaka references, a person or ordinary skill in the art of semiconductors would not use an alkali metal salt of an alkyl diphenyl ether sulfonic acid as recited in the present claims because such salts are taught to be deleterious to the semiconductors produced using the metal-containing developer compositions.

According to M.P.E.P. §2143.01, in order to establish a *prima facie* showing of obviousness, "the proposed modification cannot render the prior art unsatisfactory for its intended purpose." Sato et al. as well as the two Tanaka references et al. clearly teach away from the claimed invention because modifying any of them to create the claimed invention would render them unsatisfactory for their intended purpose, as clearly set forth in the references themselves.

A person skilled person in the art would not combine Anzures with Sato (or either of the Tanaka et al. references) or vice versa, in view of the deleterious effects of metallic elements on

semiconductors (contamination of semiconductor devices) as taught by Sato et al. and the Tanaka et al. references. Anzures et al. discloses a diphenyl oxide represented by the following formula (I):

(I)



Anzures teaches that in formula (I) above, X is preferably hydrogen, sodium, calcium, potassium or ammonium, and M is preferably $-SO_3^-$, $-PO_4^{3-}$ or $-PO_4(R')_2$ (see column 6, lines 42 to 44 of Anzures). Therefore, the diphenyl oxide represented by formula (I) above satisfies the requirements of the compound recited in the presently pending claims only when M is $-SO_3^-$ and X is sodium, calcium or potassium. However, these are all metallic elements that the primary references all teach as undesirable components that are to be avoided.

In view of the teachings of the primary references, one of ordinary skill in the art would certainly not include a diphenyl oxide represented by formula (I) above wherein X is sodium, calcium or potassium in the claimed developer composition. Rather, a diphenyl oxide in which X is a non-metal, i.e. hydrogen or ammonium, would be used, because such compounds would not be expected to contaminate semiconductor devices. In view of the explicit teachings of the Sato et al. reference, one of ordinary skill in the art would not combine Anzures with Sato or vice versa, in a manner that the developer composition of the claimed invention would be obtained. Since the modification of the compound of Anzures et al. to include the metallic element as disclosed by Sato et al. would render the teachings of Sato unsatisfactory for their intended purpose, there can be no motivation to modify the teachings of Anzures et al. to incorporate the metallic element of Sato et al. and vice versa. Therefore, there is no *prima facie* case of obviousness over the combination of these references.

In the final Office Action mailed December 27, 2007, at page 6, paragraph 3, the Examiner dismisses these arguments, stating that "the instant claims have not been excluded a use of the claimed composition in a semiconductor industry as disclosed in the instant specification on page 6, lines 3-4 with 'unlike the filed on the semiconductor' as urged." However, the Examiner has taken

this statement out of context. The complete paragraph in which lines 3-4 are found states the following:

> However, since the portion with no resist pattern is metal-coated in the application where such a thick resist pattern is formed, unlike the field of the semiconductor that requires the ion implantation process, the residual metal such as sodium, potassium or calcium causes no problem even if present.

This section of the specification explains why the presence of a residual metal in the resist pattern of the present invention is acceptable, unlike in semiconductors using ion implantation in which the presence of metal ions is undesirable (as taught by Sato et al.). Thus, nothing in Applicants' specification suggests that the claimed "developer composition for resists" is useful in any field other than semiconductors. Moreover, the Examiner has not established that one of ordinary skill in the art would have any reason whatsoever to use the claimed composition in any other field. In fact, all three of the cited references of Tanaka ('268), Tanaka ('126) and Anzures relate to the fields of semiconductors. Moreover, regardless of how the claimed composition is used, these references still teach that the presence of a metal ion is undesirable and should be avoided. Accordingly, one of ordinary skill in the art, upon reviewing Sato et al. or either of the Tanaka references would certainly not include a metal compound in the developer composition of Anzures et al. Accordingly, no proper *prima facie* showing of obviousness can be sustained on the basis of these references.

No proper *prima facie* showing of obviousness can be set forth by the combination of Sato (or either/both Tanaka et al. reference(s)) and Anzures because the primary references explicitly teach that one of ordinary skill in the art should not combine them due to the adverse effects of the metallic elements. Thus, no *prima facie* showing of obviousness can be sustained on the basis of the cited references.

Unexpected results

Even if the combination of cited references did constitute a proper *prima facie* showing of obviousness, which they do not, the significant unexpected results achieved by the presently claimed invention would rebut such a showing and establish the nonobviousness of the claims.

At page 7, paragraph 1 of the final Office Action mailed December 27, 2007, the Examiner stated that the unexpected results discussed in Applicants' previous response were given little weight since they were alleged not to be commensurate in scope with the present claims.

The unexpected results dismissed by the Examiner are present in the specification as a comparison of Examples 4, 9 and 10 with Comparative Example 10. The relative dissolution time of the claimed alkali metal-containing surfactants in Examples 4, 9 and 10 of the present specification is significantly lower than the corresponding ammonium-based surfactant in Comparative Example 1. Thus, the dissolution rate (developing sensitivity) is unexpectedly significantly improved when a metal containing anionic surfactant is used, compared to the dissolution rate obtained when a non-metallic (ammonium) anionic surfactant is used. Based on these results, the advantage of using an alkali metal containing-surfactant compared to an ammonium-based surfactant is evident.

However, Examples 4, 9, 10 are only a few of the various examples that are present in Appellants' specification. Examples 1-15 of the present application use various types of anionic, metal-containing surfactants containing different metal ions in various amounts (1,000-50,000 ppm) (see page 15, Table 1). The present invention resides in a combination of an organic quaternary ammonium base with the recited anionic surfactants, which results in an excellent dissolution rate. Because the type and amount of the organic quaternary ammonium base can be appropriately selected by those skilled in the art, it is not necessary for Applicants to use various organic quaternary ammonium bases in specific amounts in order to compare the claimed alkali metal-containing surfactants with the corresponding ammonium-based surfactant. Therefore, one skilled in the art can readily recognize that the other examples would achieve similar improvements in dissolution rates over corresponding non-metallic anionic surfactants. As such, the entire scope of the presently claimed invention can be seen to achieve unexpected results relative to the prior art. Accordingly, the unexpected results presented in the specification are clearly commensurate in scope with the claimed invention.

These unexpected results strongly support the nonobviousness of the present invention, and would effectively rebut any allegation of *prima facie* obviousness. As such, withdrawal of the rejections under 35 U.S.C. §103(a) is respectfully requested.

Conclusion

In view of the arguments presented above, Appellant submits that the present claims are not rendered obvious by any of the cited combinations of references, and respectfully request that the rejections be overturned.

Respectfully submitted,

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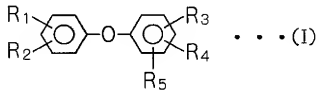
VIII. CLAIMS APPENDIX

1. **(Previously presented)** A developer composition for resists, comprising an organic quaternary ammonium base as a main component and a surfactant,

said surfactant containing an anionic surfactant represented by the following general formula (I):



• • • (I)

wherein at least one member of R_1 and R_2 represents an alkyl or alkoxy group having 5 to 18 carbon atoms and any remaining member represents a hydrogen atom, or an alkyl or alkoxy group having 5 to 18 carbon atoms, and at least one member of R_3, R_4 and R_5 represents a group represented by the following general formula (II):

$$-SO_3M \quad \bullet \bullet \bullet \quad (II)$$

wherein M represents a metal atom, and any remaining member represent a hydrogen atom or a group represented by the above general formula (II).

2. **(Original)** The developer composition for resists according to claim 1, wherein, in the general formula (II), M represents one selected from sodium, potassium and calcium, provided that, in the general formula (I), when two or more groups represented by the general formula (II) are present, M may be the same or different.

3. **(Previously presented)** A method for formation of a resist pattern, comprising applying a resist composition on a substrate to form a resist layer, prebaking the resist layer, selectively exposing the prebaked resist layer to light, and alkali-developing the exposed resist layer with the developer composition for resists according to claim 1 to form a resist pattern.

4. **(Previously presented)** A method for formation of a resist pattern, comprising applying a resist composition on a substrate to form a resist layer, prebaking the resist layer, selectively exposing the prebaked resist layer to light, and alkali-developing the exposed resist layer with the developer composition for resists according to claim 2 to form a resist pattern.

IX. Evidence Appendix

Not applicable.

X. Related Proceedings Appendix

There are no related proceedings.

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